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Patent claims

1. A piezoelectric actuator for media flowing therearound, with a piezo stack which is arranged within a deformable isolating material so as to be in direct contact therewith at least over certain regions, which isolating material is for its part enclosed by a fluidically closed actuator housing, which is formed by a housing shell and a dimensionally stable actuator top connected thereto and a dimensionally stable actuator bottom likewise connected thereto, the actuator top and the actuator bottom being arranged on the active main surfaces of the piezo stack, and in which actuator the electrical connecting lines of the piezo stack are led out of the actuator housing to the outside via or with the assistance of the actuator top and/or the actuator bottom, characterized in that the housing shell (4) is produced from a limp and/or elastic material, in that the housing shell (4) is disposed at a distance from the piezo stack (1) at all points, in that the length of the housing shell (4), measured along the surface line, corresponds at least to the maximum extent of the piezo stack (1) and/or the housing shell (4) can be stretched accordingly, in that the isolating material (3) is an electrically insulating fluid and/or gel, in that the inside volume of the actuator housing is filled at least largely with the isolating material (3) and in that the housing shell (4) and the actuator bottom (5a) and the actuator top (5b) are connected to one another in a sealing manner with respect to the isolating material (3) and the medium flowing around.

2. The piezoelectric actuator as claimed in claim 1, characterized in that the piezo stack (3) comprises piezoelectric ceramic.
- 5 3. The piezoelectric actuator as claimed in claim 1, characterized in that the actuator top (5a) and the actuator bottom (5b) are arranged equidistant from each other.
- 10 4. The piezoelectric actuator as claimed in claim 1, characterized in that the material of the housing shell (4) is at least largely resistant to the medium flowing around it, in particular fuel.
- 15 5. The piezoelectric actuator as claimed in claim 1, characterized in that the inside volume of the actuator housing is at least largely gas-free.
- 20 6. The piezoelectric actuator as claimed in claim 1, characterized in that the viscosity of the isolating medium (3) corresponds approximately to that of the medium flowing around.
- 25 7. The piezoelectric actuator as claimed in claim 1, characterized in that the material of the housing shell (4) is electrically neutral.
- 30 8. The piezoelectric actuator as claimed in claim 1, characterized in that the actuator top (5a) and the actuator bottom (5b) have a different cross-sectional area.
- 35 9. The piezoelectric actuator as claimed in claim 1, characterized in that the isolating material (3) is a silicone oil.
10. The piezoelectric actuator as claimed in claim 1, characterized in that the thermal conductivity of

the isolating material (3) is equal to or greater than that of the material of the piezo stack (1).

- 5        11. The piezoelectric actuator as claimed in claim 1, characterized in that the actuator top (5a) and/or the actuator bottom (5b) have a cross-sectional area which respectively corresponds to the assigned active surface of the piezo stack (1), arranged transversely to the main direction of extent of the  
10        piezo stack (1).
- 15        12. The piezoelectric actuator as claimed in claim 1, characterized in that the actuator top (5a) and/or the actuator bottom (5b) have at least two terminating regions, electrically insulated from each other, for the electrical connecting lines (2) of the piezo stack (1).
- 20        13. The use of a piezoelectric actuator as claimed in claim 1 for an injection valve, in particular of an internal combustion engine, preferably a gasoline or diesel engine.
- 25        14. The use of a piezoelectric actuator as claimed in claim 1 for a proportional valve.
15. The use of a piezoelectric actuator as claimed in claim 1 for a sonotrode.